MISSOURI DEPARTMENT OF TRANSPORTATION
THREE SECTION FLEXIBLE 15' CUT ROTARY MOWER

GENERAL - The intent and purpose of this specification is to establish minimum quality, safety and performance standards for heavy-duty tow type, P.T.O. driven hinged three section rotary mower providing an optional cutting swath of 5', 10', or 15' without evidence of streaking. The intent and purpose of this specification is also to describe a mower with engineering and design that will assure trouble-free Highway right-of-way mowing with a minimum amount of down time. Parts and service availability must be within 24 hour of contact.

DRIVE - The mower shall be gear driven with power transmitted directly from tractor P.T.O. to a heavy duty primary gear box or power divider located on mower center section which will transmit power to secondary gear boxes located on mower wing sections. The output shafts of primary and secondary gear boxes shall be the spindles for the blade carrier assemblies. The tractor yoke of the main driveshaft shall have a spring tension lock coupler for quick attachment to the to the tractor RPM P.T.O. output shaft. Yoke connector at the splitter gearbox shall be an interference bolt type. Quick connector yoke at splitter gearbox is not acceptable. Drivelines will have a three year warranty. A copy of the warranty must be included in your bid.

GEAR BOX ASSEMBLIES - Gears shall be of forged heat treated steel running on lubricated bearings, completely enclosed in malleable or steel housing. Gear boxes shall be reinforced base mounted type. Gearbox bolts must have the capability of being retightened from the topside. All lubrication areas will be of easy access. Gear boxes will have a three year warranty. A copy of the warranty must be included in your bid.

PRIMARY GEAR BOX - The primary power divider or gear box shall be the manufacturers premium model; engineered, rates and listed a minimum 120 HP by the gearbox manufacturer in their standard engineer/sales data. The divider gear box will evenly divide the input power between three output shafts to power three individual and separate spindle gearboxes.

SECONDARY GEAR BOX - The secondary or wing gear boxes shall be the manufacturers premium model; engineered, rates and listed a minimum have a rating minimum of 150 HP by the gearbox manufacturer in their standard engineer/sales data. Secondary gear boxes shall all be the same, except for the direction of rotation.

BLADE ROTATION - As viewed from above the deck, facing the tractor, the left wing and center section shall turn clockwise and the right wing shall turn counterclockwise

DRIVE LINES AND U-JOINTS - Heavy-duty self adjusting and telescopic drive shafts with main drive shaft to be of a 80° constant velocity type and U-Joints will be not less than 44R size and type (ASAE Category 5, 80 HP at 540 RPM). A decal shall be attached to the towing tongue detailing correct hitch placement and driveline attachment dimensions a per SAE Standard J1170, Rear Power Take-Off for Agriculture Tractors. All U-Joints will be equipped with neoprene seals and needle bearings. Drive lines and U-Joints shall automatically compensate for angles as wings are raised or lowered. P.T.O. drive lines and wing drivelines shall have quick disconnect slip clutches. Drivelines to the three gear boxes will be a minimum 35R size and type(ASAE Category 4, 46 HP at 540 RPM) size. The splitter gear box end yoke shall have a spring tension lock coupler for quick attachment/removal to the splitter gearbox shafts. Spindle gearbox yoke shall be an interference bolt type. Quick connector yoke at splitter gearbox is not acceptable. Heavy duty slip clutches(torque limiter) shall be installed before each of the three spindle gearboxes. Power take-off shaft and all drivelines shall be of one brand manufacture. Drivelines will allow a smooth transfer of torque during all modes and angles of operation of the mower. All universal joints and sliding tubes shall be equipped with grease zerks. All universal joints and driveshafts shall be completely covered with a non-rotating shield in compliance with OSHA regulations.

STRUCTURAL - Deck and wings a minimum of 7 gauge steel and reinforced with 7 gauge steel to maintain integrity. Band or skirt will be 1/4" thickness with a minimum depth of 10 1/2" welded to the deck with a continuous weld. An under deck ring, 1/2" thick by 3" high by 48" in diameter, rolled from a continuous piece of flat steel shall be continuously welded, perpendicular to the bottom of the mower's deck. The ring shall be positioned so a blade would contact it just behind the blade cutting edge. The deck ring will provide reinforcement and protection of the deck.

BLADES AND RUNNERS - The blades shall be heavy-duty 1/2" x 4" SAE 5160 chrome steel suction type with breakaway feature. Blades may have a minimum 3" drop. Blades will be mounted with replaceable minimum 1 1/8" UNF hardened blade bolts with 1 1/2" blade wear surface. The three gear box spindles shall be equipped with heavily reinforced round dish (stump jumper) blade carrier. Carrier will be a dish shaped minimum 7 gauge steel stamping with a minimum 30" diameter and 2 3/4" side height. When installed the top lip of dish shall be no more than 4" from the bottom of the deck. The blade carrier shall be dynamically balanced to minimize vibration. Replaceable, hard faced, skid shoes on center and wing sections shall be provided for protection in the event the tractor drops in a low place or ridges over a high point. Blades shall overlap 6". Mower shall be equipped with adjustable mechanical stops to prevent scalping when the mower is lowered to the cutting position. A system shall be provided to lock the center section and both wings in roading position. Transport locks shall be mechanical devices to remove all stress from the hydraulic cylinders and their mounts.

CUTTING HEIGHT - Adjustable from 4" - 12".

HYDRAULICS - The mower shall utilize the tractor hydraulic system and have hydraulic cylinders to raise the wings and adjust the cutting height. The wing cylinders shall allow for a minimum of 11° wing movement or float during operation without pumping the hydraulics. Hydraulic cylinders shall be designed for 3,000 PSI operating pressure. All cylinder shafts will be hard chrome plated and rebuildable. The piston seal shall be poly-hone glass-filled-teflon type, O-ring seal designs are not acceptable. The piston rod packing shall be a V-stack or U-pack design. V-stack shall include provisions for adjustment, U-pack shall be retained in an internal groove. Rod wiper shall be a urethane wiper ring(not metal clad). Gland collar will be either externally threaded onto the outside of the cylinder barrel or internally threaded into the cylinder barrel. Designs using an internal wire/lock ring to hold the gland in/on are not acceptable. The hydraulic inlet and outlet shall be welded fixed ferrules located on the cylinder shell. Wings will be capable of flexing from 22° below horizontal to 90° above horizontal to follow any terrain. You should not include the hydraulic valves which will be supplied on the tractors. All hoses(minimum 1/2" ID 2-wire non-skive) and quick couplings necessary for mounting on the tractor should be included. Safe-guards shall be provided to stop the wings from raising to a point that would prevent it from being lowered from the operators station. Mower shall have an A-Frame or similar support to protect the hoses between tractor and mower. The mower shall have a manually operated auxiliary winch to raise or lower each wing independently in case of hydraulic failure and rods or bars to secure the wings when roading. Hydraulics will meet SAE J517 and J232 requirements.

WHEELS, AXLES AND SUSPENSIONS - The mower shall be equipped with not less than six trail type laminated tires properly spaced for best weight distribution. The wheels will be mounted with a minimum of five lug bolts and the wheel hubs shall have roller bearings. Rear axle arrangement shall provide for two sets of two wheels each at center section, and a single wheel at each wing section. Main axle, axle arms and wheel spindles will be heavy duty with independent heavy-duty 3" spring suspension for each wheel. All wheel hubs will be heavy duty cast type with grease zerk.

HITCH - Towing hitch shall be a heavy-duty swivel clevis type providing easy maneuverability. Hitch shall be of adequate design to accommodate all angles and stress caused from roadside right-of-way mowing. The tongue will be "A" frame design. Twin leveling rods to balance the weight.

PARKING JACK - A heavy-duty retractable pin-on type hand operated screw type jack is to be furnished and installed on the tongue perpendicular to the ground with the mower set at a 6" mowing height to aid in attaching the mower to the tractor. A second mount for this jack shall be attached to the top of the mower deck to safely store it when not in use and not to interfere with mowing operation.

SAFETY - All guards and shields will meet SAEJ232 requirements. The mower shall have 3/8" safety chain guards to protect the area surrounding the mower from flying objects. A minimum 3/16" high strength aircraft cable shall be interlaced through the second to the lowest chain link. Unit will have wing transport locks.

COLOR - Color to be manufacturer's standard over a prime coat.

NOTE: Complete unit must be manufactured in accordance with the latest adopted OSHA or SAE Standards and amendments thereto.

The Missouri Highway and Transportation Commission reserves the right to waive technicalities and to reject any or all bids and no bid is final until formally accepted by the Commission.